Differential staining of milk somatic cells and the udder health

L. Pongrácz & J. Iváncsics

University of West Hungary, Faculty of Agricultural Sciences, Institute of Animal Breeding and Husbandry, H-9200 Mosonmagyaróvár, Vár 4., Hungary

Introduction

Differential counting of milk somatic cells can be a useful diagnostic tool in bovine mastitis research because each cell type has its own more or less specific function in the immune response. Panoptic staining with Pappenheim, Giemsa, Wright or Leishman stains is a standard technique in haematological diagnostic procedures and, based on these, the direct smear method commonly used for observing somatic cells in milk is usually similar to blood smear technique. Similarly, the May-Grünwald stain may be used to observe milk somatic cells.

Material and methods

Milk samples were obtained from the Lajta-Hanság State Farm dairy herd which consists of ~ 600 Holstein cows aged 2 to 10 years with most animals being 4-5 years of age. To verify the stability of cells in milk, samples (n=16) were collected from individual quarters by hand stripping and were examined within 1-2 hours.

Smears of raw milk from healthy cows were air-dried, fixed and stained according to May-Grünwald (Reanal R6 - R3). Alternatively, 5 ml of milk was added to a centrifuge tube containing 3 ml of ice-cold isotonic salt solution. Aliquots were centrifuged at room temperature for 10 min at 2000 rpm in order to multiplicate cells. The supernatant, including the butterfat layer, was removed from the walls of the tube by cotton-tipped applicators and the pellet was resuspended in 0,5 ml isotonic salt solution. Smears were air-dried, fixed and stained as described before.

On each slide 100 (or 200) cells were counted at magnification and identified as neutrophils, eosinophils, basophils, lymphocytes, monocytes or macrophages.

Results

Overall means of somatic cell count (SCC) and percentages of different cell types are given in table 1.

Table 1. SCC and ratio of cell types (lymphocytes, granulocytes and monocytes).

Cow no.	n	SCC	Mean Lymph %	Granul %	Mono %
1	4	372.000	13	25	53
2	4	184.000	10	23	62
3	4	269.000	14	37	48
4	4	437.000	18	46	35
Σ / mean	16	315.500	13,75	32,75	51

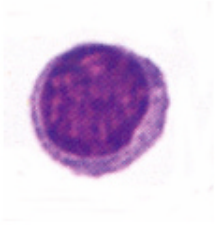

Figure 1. Lymphocyte.

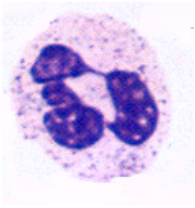

Figure 2. Granulocyte.

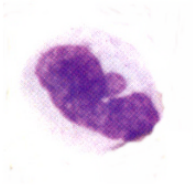

Figure 3. Monocyte.

The lymphocyte (Figure 1) was the least frequent, granulocyte (Figure 2) the most variable and monocyte (Figure 3) the most common cell type in the samples.

This rapid staining procedure is appropriate for processing relatively large numbers of samples and sufficient to allow identification of cell populations in milk.

Conclusions

Application of this simple and cheap procedure provides additional information about cell types for understanding the udder health status, treating mastitic cases and several characteristics of cells in milk can be evaluated. It is conceivable that not only the quantity of cells but also their functionality should be taken into account.

References

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